

1926

Direct Absolute Measurement of Acoustic Impedance

G. W. Stewart
State University of Iowa

Copyright ©1926 Iowa Academy of Science, Inc.

Follow this and additional works at: <https://scholarworks.uni.edu/pias>

Recommended Citation

Stewart, G. W. (1926) "Direct Absolute Measurement of Acoustic Impedance," *Proceedings of the Iowa Academy of Science*, 33(1), 252-252.

Available at: <https://scholarworks.uni.edu/pias/vol33/iss1/74>

This Research is brought to you for free and open access by the Iowa Academy of Science at UNI ScholarWorks. It has been accepted for inclusion in Proceedings of the Iowa Academy of Science by an authorized editor of UNI ScholarWorks. For more information, please contact scholarworks@uni.edu.

those formerly known. Experimental tests verify the correctness of the theory.

STATE UNIVERSITY OF IOWA,
IOWA CITY, IOWA.

DIRECT ABSOLUTE MEASUREMENT OF ACOUSTIC IMPEDANCE

G. W. STEWART

(ABSTRACT)

Advantage is taken of the author's theory of the transmission in an acoustic line with an attached branch which alters the intensity and the pressure phase of the transmitted sound. By the measurement of the relative intensities and phases with and without the branch present, it is possible to obtain the components Z_1 and Z_2 of the impedance, $Z = Z_1 + iZ_2$, of the branch. If s is the area of the conduit, P_o and P'_o the two pressure amplitudes, ϵ the change in phase, ρ the density of the medium, a the velocity of sound therein,

$$Z_1 = (\rho a / 2s) [A / (A^2 + B^2)] \text{ and } Z_2 = (\rho a / 2s) [B / (A^2 + B^2)],$$

wherein $A = (P_o / P'_o \cos \epsilon - 1)$ and $B = - (P_o / P_o) \sin \epsilon$.

The method involves only the *relative* magnitudes of pressure amplitudes and the direct measurement of phase change. In the present application the pressure ratio is determined by altering a comparison source, and the phase is measured directly. The method involves only one simple absolute measurement and is a strictly acoustic method somewhat analogous to methods of measurement long used in electricity.

STATE UNIVERSITY OF IOWA,
IOWA CITY, IOWA.

VARIATION OF THE INTENSITY OF THE SPECTRAL LINES OF MERCURY WITH THE VELOCITY OF THE EXCITING ELECTRONS

W. D. CROZIER

(ABSTRACT)

A study has been made of the variation of the intensity of the spectral lines of mercury when excited by impact of electrons of